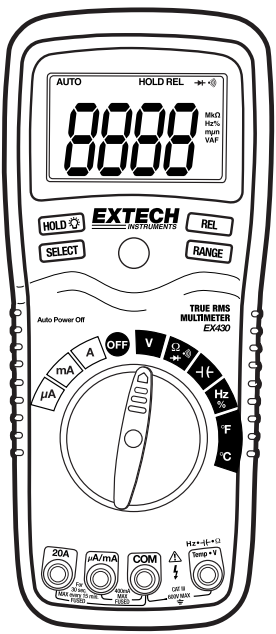
Test Equipment Depot
1-800-517-8431

User's Guide

EXTECH INSTRUMENTS

True RMS Multimeter

Extech 430



Introduction

Congratulations on your purchase of the Extech 430 (part number EX430) True RMS Autoranging Multimeter. This meter measures AC/DC Voltage, AC/DC Current, Resistance, Capacitance, Frequency, Duty Cycle, Diode Test, and Continuity plus Thermocouple Temperature. Proper use and care of this meter will provide many years of reliable service.

Safety

This symbol adjacent to another symbol, terminal or operating device indicates that the operator must refer to an explanation in the Operating Instructions to avoid personal injury or damage to the meter.

WARNING

This **WARNING** symbol indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.

CAUTION

This **CAUTION** symbol indicates a potentially hazardous situation, which if not avoided, may result damage to the product.

This symbol advises the user that the terminal(s) so marked must not be connected to a circuit point at which the voltage with respect to earth ground exceeds (in this case) 600 VAC or VDC.

This symbol adjacent to one or more terminals identifies them as being associated with ranges that may, in normal use, be subjected to particularly hazardous voltages. For maximum safety, the meter and its test leads should not be handled when these terminals are energized.

This symbol indicates that a device is protected throughout by double insulation or reinforced insulation.

OVERVOLTAGE CATEGORY III

This meter meets the IEC 610-1-95 standard for OVERVOLTAGE CATEGORY III. Cat III meters are protected against overvoltage transients in fixed installation at the distribution level. Examples include switches in the fixed installation and some equipment for industrial use with permanent connection to the fixed installation.

SAFETY INSTRUCTIONS

This meter has been designed for safe use, but must be operated with caution. The rules listed below must be carefully followed for safe operation.

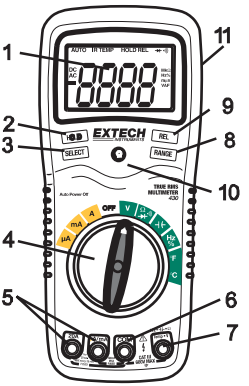
1. **NEVER** apply voltage or current to the meter that exceeds the specified maximum:

Input Protection Limits	
Function	Maximum Input
V DC or V AC	1000V DC/750V AC, 200Vrms on 400mV range
mA AC/DC	500mA 250V fast acting fuse
A AC/DC	20A 250V fast acting fuse(30 seconds max every 15 minutes)
Frequency, Resistance, Capacitance, Duty Cycle, Diode Test, Continuity	250Vrms for 15sec max
Temperature	60V DC/24V AC

2. **USE EXTREME CAUTION** when working with high voltages.
3. **DO NOT** measure voltage if the voltage on the "COM" input jack exceeds 600V above earth ground.
4. **NEVER** connect the meter leads across a voltage source while the function switch is in the current, resistance, or diode mode. Doing so can damage the meter.
5. **ALWAYS** discharge filter capacitors in power supplies and disconnect the power when making resistance or diode tests.
6. **ALWAYS** turn off the power and disconnect the test leads before opening the covers to replace the fuse or battery.
7. **NEVER** operate the meter unless the back cover and the battery and fuse covers are in place and fastened securely.

Controls and Jacks

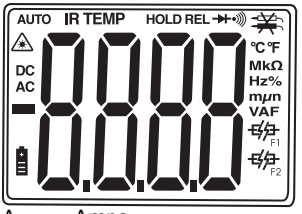
1. 4000 count LCD display
2. HOLD
3. SELECT button
4. Function switch
5. mA, uA and A input jacks
6. COM input jack
7. Positive input jack
8. RANGE hold button
9. RELATIVE button
10. Backlight button
11. Protective holster



Note: Tilt stand and battery compartment are on rear of unit.

Symbols and Annunciators

•)))	Continuity
▶|–	Diode test
	Battery status
	Test lead connection error
n	nano (10^{-9}) (capacitance)
µ	micro (10^{-6}) (amps, cap)
m	milli (10^{-3}) (volts, amps)
k	kilo (10^{3}) (ohms)
M	mega (10^{6}) (ohms)
Hz	Hertz (frequency)
%	Percent (duty ratio)
AC	Alternating current
DC	Direct current
ºF	Degrees Fahrenheit



A	Amps
F	Farads (capacitance)
Ω	Ohms
V	Volts
REL	Relative
AUTO	Autoranging
HOLD	Display hold
ºC	Degrees Centigrade

Specifications

Function	Range	Resolution	Accuracy	
DC Voltage	400mV	0.1mV	±(0.3% reading + 2 digits)	
	4V	0.001V	±(0.5% reading + 2 digits)	
	40V	0.01V		
	400V	0.1V		
	1000V	1V	±(0.8% reading + 3 digits)	
AC Voltage			50 to 400Hz	400Hz to 1kHz
	400mV	0.1mV	±(1.5% reading + 15 digits)	±(2.5% reading + 15digits)
	4V	0.001V	±(1.5% reading + 6 digits)	±(2.5% reading + 8 digits)
	40V	0.01V		
	400V	0.1V		
	750V	1V	±(1.8% reading + 6 digits)	±(3% reading + 8 digits)
DC Current	400μA	0.1μA	±(1.5% reading + 3 digits)	
	4000μA	1μA		
	40mA	0.01mA		
	400mA	0.1mA		
	4A	0.001A	±(2.5% reading + 5 digits)	
	20A	0.01A		
AC Current			50 to 400Hz	400Hz to 1KHz
	400μA	0.1μA	±(1.8% reading + 8 digits)	±(3.0% reading + 7 digits)
	4000μA	1μA		
	40mA	0.01mA		
	400mA	0.1mA		
	4A	0.001A	±(3.0% reading + 8 digits)	±(3.5% reading + 10 digits)
	20A	0.01A		

NOTE: Accuracy is stated at 65°F to 83°F (18°C to 28°C) and less than 75% RH.

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Function	Range	Resolution	Accuracy
Resistance	400Ω	0.1Ω	±(0.8% reading + 4 digits)
	4kΩ	0.001kΩ	±(0.8% reading + 2 digits)
	40kΩ	0.01kΩ	±(1.0% reading + 2 digits)
	400kΩ	0.1kΩ	
	4MΩ	0.001MΩ	
	40MΩ	0.01MΩ	±(3.0% reading + 5 digits)
Capacitance	40nF	0.01nF	±(5.0% reading + 7 digits)
	400nF	0.1nF	±(3.0% reading + 5 digits)
	4μF	0.001μF	±(3.5% reading + 5 digits)
	40μF	0.01μF	
	100μF	0.1μF	±(5.0% reading + 5 digits)
Frequency	5.000Hz	0.001Hz	±(1.5% reading + 5 digits)
	50.00Hz	0.01Hz	
	500.0Hz	0.1Hz	±(1.2% reading + 2 digits)
	5.000kHz	0.001kHz	
	50.00kHz	0.01kHz	
	500.0kHz	0.1kHz	
	5.000MHz	0.001MHz	±(1.5% reading + 4 digits)
	10.00MHz	0.01MHz	
	Sensitivity: 0.8V rms min. @ 20% to 80% duty cycle and <100kHz; 5Vrms min @ 20% to 80% duty cycle and > 100kHz.		
Duty Cycle	0.1 to 99.9%	0.1%	±(1.2% reading + 2 digits)
	Pulse width: 100μs - 100ms, Frequency: 5Hz to 150kHz		
Temp (type-K)	-4 to 1382°F	1°F	±(3.0% reading + 3 digits) (probe accuracy not included)
	-20 to 750°C	1°C	

NOTE: Accuracy specifications consist of two elements:

- (% reading) – This is the accuracy of the measurement circuit.
- (+ digits) – This is the accuracy of the analog to digital converter.

Diode Test	Test current of 0.3mA maximum, open circuit voltage 1.5V DC typical
Continuity Check	Audible signal will sound if the resistance is less than 150Ω (approx.), test current <0.7mA
Temperature Sensor	Requires type K thermocouple
Input Impedance	>7.5MΩ (VDC & VAC)
AC Response	True rms
ACV Bandwidth	50Hz to 1kHz
Display	4000 count backlit liquid crystal
Overrange indication	"OL" is displayed
Auto Power Off	15 minutes (approximately)
Polarity	Automatic (no indication for positive); Minus (-) sign for negative
Measurement Rate	2 times per second, nominal
Low Battery Indication	**"** **"** is displayed if battery voltage drops below operating voltage
Battery	One 9 volt (NEDA 1604) battery
Fuses	mA, µA ranges; 0.5A/250V fast blow A range; 20A/250V ceramic fast blow
Operating Temperature	41ºF to 104ºF (5ºC to 40ºC)
Storage Temperature	-4°F to 140°F (-20°C to 60°C)
Operating Humidity	Max 80% up to 87ºF (31ºC) decreasing linearly to 50% at 104ºF(40ºC)
Storage Humidity	<80%
Operating Altitude	7000ft. (2000meters) maximum.
Weight	0.753lb (342g) (includes holster).
Size	7.36" x 3.2" x 2.0" (187 x 81 x 50mm) (includes holster)
Safety	For indoor use and in accordance with the requirements for double insulation to IEC1010-1 (1995): EN61010-1 (1995) Overvoltage Category III 600V and Category II 1000V, Pollution Degree 2.

Operating Instructions

WARNING: Risk of electrocution. High-voltage circuits, both AC and DC, are very dangerous and should be measured with great care.

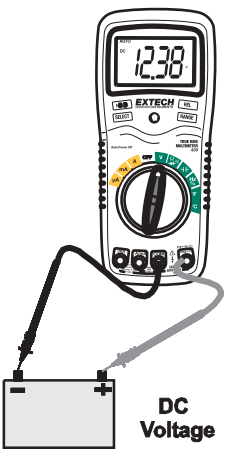
1. ALWAYS turn the function switch to the OFF position when the meter is not in use.
2. If "OL" appears in the display during a measurement, the value exceeds the range you have selected. Change to a higher range.

NOTE: On some low AC and DC voltage ranges, with the test leads not connected to a device, the display may show a random, changing reading. This is normal and is caused by the high-input sensitivity. The reading will stabilize and give a proper measurement when connected to a circuit.

DC VOLTAGE MEASUREMENTS

CAUTION: Do not measure DC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

1. Set the function switch to the green V position.
2. Press the SELECT button to indicate "DC" on the display.
3. Insert the black test lead banana plug into the negative **COM** jack. Insert the red test lead banana plug into the positive **V** jack.
4. Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
5. Read the voltage in the display.

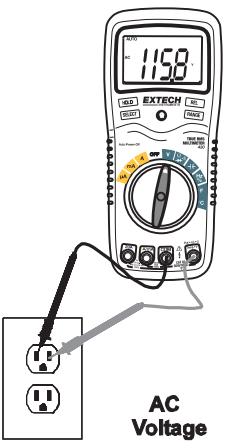


AC VOLTAGE MEASUREMENTS

WARNING: Risk of Electrocution. The probe tips may not be long enough to contact the live parts inside some 240V outlets for appliances because the contacts are recessed deep in the outlets. As a result, the reading may show 0 volts when the outlet actually has voltage on it. Make sure the probe tips are touching the metal contacts inside the outlet before assuming that no voltage is present.

CAUTION: Do not measure AC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

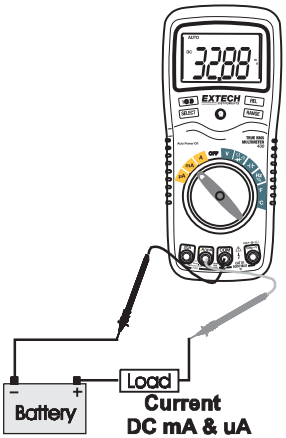
1. Set the function switch to the green V position.
2. Press the SELECT button to indicate "AC" on the display.
3. Insert the black test lead banana plug into the negative **COM** jack. Insert red test lead banana plug into the positive **V** jack.
4. Touch the black test probe tip to the neutral side of the circuit. Touch the red test probe tip to the "hot" side of the circuit.
5. Read the voltage in the display.



DC CURRENT MEASUREMENTS

CAUTION: Do not make current measurements on the 20A scale for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or the test leads.

1. Insert the black test lead banana plug into the negative **COM** jack.
2. For current measurements up to 4000µA DC, set the function switch to the yellow µA position and insert the red test lead banana plug into the **µA/mA** jack
3. For current measurements up to 400mA DC, set the function switch to the yellow mA position and insert the red test lead banana plug into the **µA/mA** jack.
4. For current measurements up to 20A DC, set the function switch to the yellow 20A range and insert the red test lead banana plug into the **20A** jack.



5. Press the SELECT button to indicate "**DC**" on the display.
6. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
7. Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
8. Apply power to the circuit.
9. Read the current in the display.

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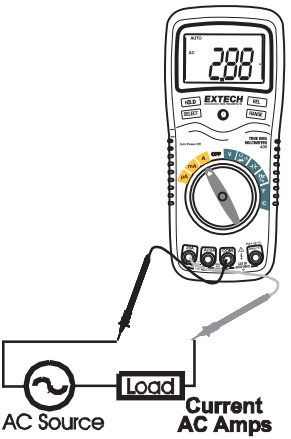
AC CURRENT MEASUREMENTS

CAUTION: Do not make current measurements on the 20A scale for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or the test leads.

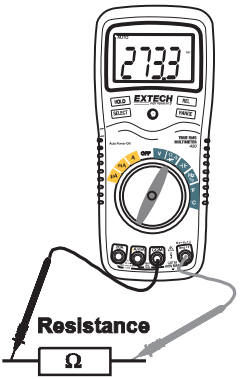
1. Insert the black test lead banana plug into the negative **COM** jack.
2. For current measurements up to 4000µA AC, set the function switch to the yellow µA position and insert the red test lead banana plug into the **µA/mA** jack
3. For current measurements up to 400mA AC, set the function switch to the yellow mA position and insert the red test lead banana plug into the **µA/mA** jack.
4. For current measurements up to 20A AC, set the function switch to the yellow 20A range and insert the red test lead banana plug into the **20A** jack.
5. Press the SELECT button to indicate "**AC**" on the display.
6. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
7. Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
8. Apply power to the circuit.
9. Read the current in the display.



RESISTANCE MEASUREMENTS

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.

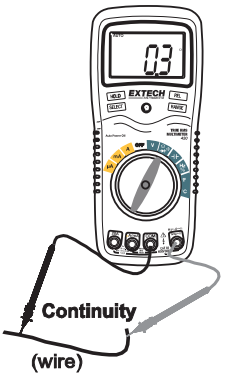
1. Set the function switch to the green Ω position.
2. Insert the black test lead banana plug into the negative **COM** jack. Insert the red test lead banana plug into the positive **Ω** jack.
3. Press the SELECT button to indicate Ω on the display.
4. Touch the test probe tips across the circuit or part under test. It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.
5. Read the resistance in the display.



CONTINUITY CHECK

WARNING: To avoid electric shock, never measure continuity on circuits or wires that have voltage on them.

1. Set the function switch to the green position.
2. Insert the black lead banana plug into the negative **COM** jack. Insert the red test lead banana plug into the positive **Ω** jack.
3. Press the SELECT button to indicate on the display.
4. Touch the test probe tips to the circuit or wire you wish to check.
5. If the resistance is less than approximately 150Ω, the audible signal will sound. If the circuit is open, the display will indicate “OL”.

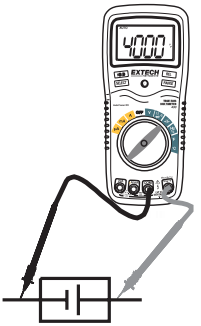


DIODE TEST

1. Set the function switch to the green position.
2. Insert the black test lead banana plug into the negative **COM** jack and the red test lead banana plug into the positive **diode** jack.
3. Press the SELECT button to indicate on the display.
4. Touch the test probes to the diode under test. Forward voltage will typically indicate 0.400 to 0.700V. Reverse voltage will indicate “**OL**”.. Shorted devices will indicate near 0V and an open device will indicate “**OL**” in both polarities.

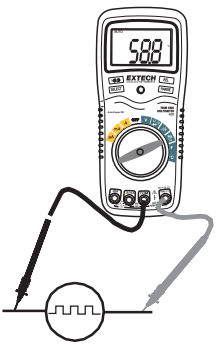
CAPACITANCE MEASUREMENTS

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements. Remove the batteries and unplug the line cords.



1. Set the rotary function switch to the green ⊣⊢ position.
2. Insert the black test lead banana plug into the negative **COM** jack.
   Insert the red test lead banana plug into the positive ⊣⊢ jack.
3. Touch the test leads to the capacitor to be tested.
4. Read the capacitance value in the display

FREQUENCY MEASUREMENTS



1. Set the rotary function switch to the green “Hz” position.
2. Insert the black lead banana plug into the negative **COM** jack and the red test lead banana plug into the positive **Hz** jack.
3. Touch the test probe tips to the circuit under test.
4. Read the frequency on the display.

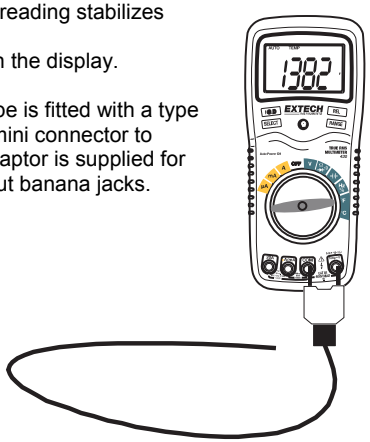
% DUTY CYCLE

1. Set the rotary function switch to the “Hz” position.
2. Insert the black lead banana plug into the negative **COM** jack and the red test lead banana plug into the positive **Hz** jack.
3. Press the SELECT key momentarily to select % in the display.
4. Touch the test probe tips to the circuit under test.
5. Read the % duty cycle on the display.

CONTACT TEMPERATURE MEASUREMENTS

1. Set the function switch to the black Type K ºF or ºC position.
2. Insert the Temperature Probe into the input jacks, making sure to observe the correct polarity.
3. Touch the Temperature Probe head to the part whose temperature you wish to measure. Keep the probe touching the part under test until the reading stabilizes (about 30 seconds).
4. Read the temperature in the display.

Note: The temperature probe is fitted with a type K mini connector. A mini connector to banana connector adaptor is supplied for connection to the input banana jacks.



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AUTORANGING/MANUAL RANGE SELECTION

When the meter is first turned on, it automatically goes into AutoRanging. This automatically selects the best range for the measurements being made and is generally the best mode for most measurements. For measurement situations requiring that a range be manually selected, perform the following:

1. Press the RANGE key. The **AUTO** display indicator will turn off.
2. Press the RANGE key to step through the available ranges until you select the range you want.
3. To exit the Manual Ranging mode and return to AutoRanging, press and hold the RANGE key for 2 seconds.

Note: Manual ranging does not apply for the Capacitance, Frequency and Temperature functions.

RELATIVE MODE

The relative measurement feature allows you to make measurements relative to a stored reference value. A reference voltage, current, etc. can be stored and measurements made in comparison to that value. The displayed value is the difference between the reference value and the measured value.

1. Perform the measurement as described in the operating instructions.
2. Press the REL button to store the reading in the display and the "REL" indicator will appear on the display.
3. The display will now indicate the difference between the stored value and the measured value.
4. Press the REL button to exit the relative mode.

Note: The Relative function does not operate in the Frequency function.

DISPLAY BACKLIGHT

Press the ☼ key for to turn on or off the display backlight function. The backlight will automatically turn off after 30 seconds.

HOLD

The hold function freezes the reading in the display. Press the HOLD key momentarily to activate or to exit the hold function.

AUTO POWER OFF

The auto off feature will turn the meter off after 15 minutes.

LOW BATTERY INDICATION

The icon will appear in the lower left conner of the display when the battery voltage becomes low. Replace the battery when this appears.

WRONG CONNECTION INDICATION

The icon will appear in the upper right conner of the display and the buzzer will sound whenever the positive test lead is inserted into the 20A or uA/mA input jack and a non-current (green, black or red) function is selected. If this occurs, turn the meter off and reinsert the test lead into the proper input jack for the function selected.

Maintenance

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the back cover or the battery or fuse covers.

WARNING: To avoid electric shock, do not operate your meter until the battery and fuse covers are in place and fastened securely.

This MultiMeter is designed to provide years of dependable service, if the following care instructions are performed:

1. **KEEP THE METER DRY**. If it gets wet, wipe it off.
2. **USE AND STORE THE METER IN NORMAL TEMPERATURES.** Temperature extremes can shorten the life of the electronic parts and distort or melt plastic parts.
3. **HANDLE THE METER GENTLY AND CAREFULLY.** Dropping it can damage the electronic parts or the case.
4. **KEEP THE METER CLEAN.** Wipe the case occasionally with a damp cloth. DO NOT use chemicals, cleaning solvents, or detergents.
5. **USE ONLY FRESH BATTERIES OF THE RECOMMENDED SIZE AND TYPE.** Remove old or weak batteries so they do not leak and damage the unit.
6. **IF THE METER IS TO BE STORED FOR A LONG PERIOD OF TIME**, the battery should be removed to prevent damage to the unit.

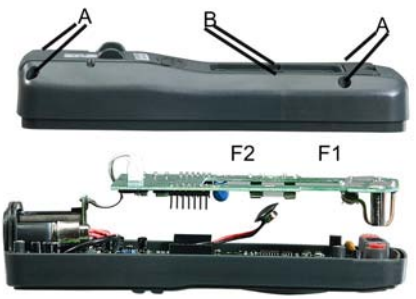
BATTERY INSTALLATION

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery cover.

1. Turn power off and disconnect the test leads from the meter.
2. Open the rear battery cover by removing two screws (B) using a Phillips head screwdriver.
3. Insert the battery into battery holder, observing the correct polarity.
4. Put the battery cover back in place. Secure with the screw.

WARNING: To avoid electric shock, do not operate the meter until the battery cover is in place and fastened securely.

NOTE: If your meter does not work properly, check the fuses and battery to make sure that they are still good and that they are properly inserted.



REPLACING THE FUSES

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the fuse cover.

1. Disconnect the test leads from the meter.
2. Remove the protective rubber holster.
3. Remove the battery cover (two “B” screws) and the battery.
4. Remove the four “A” screws securing the rear cover.
5. Lift the center circuit board straight up from the connectors to gain access to the fuse holders.
6. Gently remove the old fuse and install the new fuse into the holder.
7. Always use a fuse of the proper size and value (0.5A/250V fast blow for the 400mA range, 20A/250V fast blow for the 20A range).
8. Align the center board with the connectors and gently press into place.
9. Replace and secure the rear cover, battery and battery cover.

WARNING: To avoid electric shock, do not operate your meter until the fuse cover is in place and fastened securely.

UL LISTED
The UL mark does not indicate that this product has been evaluated for the accuracy of its readings.

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